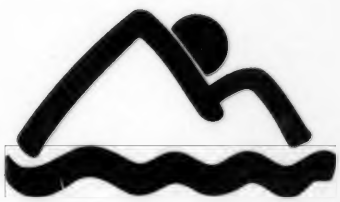
BC Environment

Revising British Columbia's Waste Discharge Permit Fee System: A Discussion Paper



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REVISING BRITISH COLUMBIA'S

WASTE DISCHARGE PERMIT FEE SYSTEM:

A DISCUSSION PAPER

January, 1992

Evaluation, Economics and Laboratory Services Branch
Environmental Protection Division
Ministry of Environment, Lands and Parks
Province of British Columbia

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EXECUTIVE SUMMARY

The Ministry of Environment, Lands and Parks is seeking public review of its proposals for revising the Province's waste discharge permit fee system. Revisions are necessary because the current fee system is not fair in its treatment of different polluters and is not consistent with the Province's polluter-pay policy which states "the more you pollute, the more you pay". For example:

- **Municipal** fees are based on the volume of waste discharged and do not take into account the toxicity of discharges. Thus, municipalities that undertake secondary or tertiary treatment of their sewage are not rewarded and must pay the same fees as municipalities discharging raw sewage.

- **Industrial** fees are, in most cases, based on the production capacity of the firm and do not take into consideration either the volume or toxicity of waste discharged. Thus, a firm that has invested in up-to-date pollution abatement technology faces the same fees as a firm in the same industry group that operates with less effective pollution abatement equipment.

The Ministry proposes to restructure the fees so that they are calculated on the basis of the volume and toxicity of a permittee's discharges. The Ministry's proposal is based on the principles of equity, polluter pay, cost recovery and reinvestment of surcharge permit fee revenues in environmental initiatives.

- **Equity**: the same basic method of calculating fees would be applied to all polluters. This will ensure that permittees discharging similar types and quantities of wastes will have similar fees.

- **Polluter Pay**: basing a permittee's fees on the volume and toxicity of its discharges will ensure that the more a permittee pollutes the more it will pay. A permittee can always reduce fees by reducing discharges.

- **Cost Recovery**: basic fee revenues would at least be used to pay the costs of permit administration. Fees could be raised beyond administrative cost levels to increase the economic incentive to decrease pollution.

Reinvestment: surcharge fee revenues are deposited to the Sustainable Environment Fund and are used to finance environmental initiatives such as the demonstration of new technologies for the collection, treatment and disposal of industrial and municipal wastes.

This proposal illustrates the Ministry of Environment, Lands and Parks' commitment to the use of economic incentives to satisfy its ambitious, long-term vision of zero pollution and full environmental protection.

It must be stressed that the proposals for revising the Province's waste discharge permit fee system, as outlined in this paper, are just proposals and do not represent the final version of the revised waste discharge permit fee system. Since these revisions could affect many businesses and communities in this province, it is only fair that all interested parties have an opportunity to comment on these proposals before any final decisions are made. Thus, the Ministry now invites public comments on this proposal. All written submissions must be received by the Ministry by March 15, 1992.

Following receipt, analysis and consideration of all comments from interested individuals, groups, and organizations, the Ministry intends to implement a new fee system by July 1, 1992.

Submissions on the proposed waste discharge fee system should be forwarded to:

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REVISING BRITISH COLUMBIA'S WASTE DISCHARGE PERMIT FEE SYSTEM

1. BACKGROUND

Concern over pollution and its effects on the local, national, and global environment are at the forefront of the social agenda. Concern has also grown about the effectiveness of the traditional regulatory approach to pollution control. These concerns have led to increasing calls for governments to expand their arsenal of pollution control strategies to include the use of market-based incentives such as waste discharge fees, transferable discharge permits, deposit-refund systems, and environmental excise taxes. It has been argued that market-based incentives can be used to harness market forces as a means to control pollution resulting from economic activities. These instruments, by creating prices for environmental resources, will encourage industries to reduce their discharges of pollutants and provide consumers with an incentive to decrease their use of environmentally damaging products.

A second, but interrelated issue is how government should pay for pollution control and waste management. From an economic perspective it is the waste generator (polluter) who should bear the ultimate responsibility for his or her waste products (pollutants). As such, the monies necessary to fund waste management and pollution control should come from the waste generators and not from general tax revenue. To do otherwise would mean that the general public would be subsidizing the waste disposal costs of waste producers. Under these circumstances, the waste producers would have no incentive to either reduce their waste production or to find alternative waste disposal methods.

This view, that it is polluters and not government who should fund waste management, was formalized as the "polluter-pays principle" and adopted by all member nations of the Organization for Economic Cooperation and Development (OECD), including Canada. In its guiding principles, the OECD states:

> The principle to be used for allocating costs of pollution prevention and control measures to encourage rational use of scarce environmental resources and to avoid distortions in international trade and investment is the so-called "Polluter-Pays Principle". The principle means that the polluter should bear the expenses of carrying the above mentioned measures decided by public authorities to ensure that the environment is in an

acceptable state. In other words, the cost of these measures should be reflected in the cost of goods and services which cause pollution in production and/or consumption. (OECD, 1975).

As part of an overall government approach to encourage a sustainable environment, the 1990 Provincial Budget introduced several new market-based incentives. These included new environmental levies on certain products and the proposal to modify the waste discharge fee system as outlined below:

- Exemption from Social Service Tax (sales tax) removed from disposable diapers;

- Sales tax exemption for agricultural use of biological control agents implemented;

- Disposal levy of $3 imposed on new vehicle tires;

- Disposal levy of $5 imposed on new lead acid batteries; and

- Changes to the waste discharge fee system to base the fees on the quantity and toxicity of the wastes discharged.

These incentives address well documented environmental problems. Increasing prices will create incentives for polluters to reduce pollution in order to reduce their costs and for consumers to decrease their use of environmentally damaging products. Resulting revenues are dedicated to environmental programs through the Sustainable Environment Fund.

2. PURPOSE AND OUTLINE

The purpose of this paper is to present for public review and comment the Ministry of Environment, Lands and Parks' proposals for revising waste discharge permit fees in accordance with the government's direction. The need for public review and comment is critical because this is a new initiative which can affect almost every firm and municipality in the province. It is important that those affected by the revisions understand the intent of the fees and that government be made aware of all potential impacts resulting from the implementation of the fees. It must be stressed that these proposals to revise the waste discharge permit fee system are just that, proposals, and do not represent the final version of a revised waste discharge permit fee system.

The next section discusses the economic aspects of pollution: why pollutants are created and how market forces presently operate against the protection of the environment. Section 4 outlines how market-based incentives can be used, in part, to correct the way our economy treats the environment. Section 5 describes the objectives a waste discharge permit fee system could achieve. Section 6 describes the current fee system while Section 7 highlights the need to change it by assessing the ability of the current system to achieve the desired objectives of an ideal waste discharge permit fee system. Section 8 presents examples of fee systems used by other jurisdictions that British Columbia could use as models. Sections 9 and 10 present the Ministry of Environment, Lands and Parks' proposals for revising the permit fee system. Section 11 describes the Sustainable Environment Fund and reviews how the revenue from the waste discharge permit fees will be used. Section 12 provides a summary and describes how the public can comment on the Ministry's proposals.

3. ECONOMIC ASPECTS OF POLLUTION

Firms create pollutants as a result of their production processes[1]. During these processes, primary and side products are generated. The side products can in turn be broken down into by-products and waste products. Whereas a by-product can be recovered profitably, the cost of recovering a waste product is greater than its return. In other words, waste products are those side products which a firm does not find profitable to recover. Pollution occurs when the waste products are discharged into the environment at a rate that exceeds the environment's natural capacity to assimilate pollutants.

When a firm discharges its waste products to the air, water or land it can cause damage to the environment and to other users of the environment. The added social costs of environmental damage are not usually borne by the polluting firm and, thus, these costs are referred to as "external" costs as the costs are external to the firm. Because these costs are external, the firm would not normally take these costs into account when deciding on how much wastes the firm will discharge.

In addition, because of the common property nature of the environment, many firms can freely discharge their wastes into the environment. A common property resource is one where the public has free and open access to its use. When property rights are specified in this manner, it usually leads to the overuse of the resource or, as Garret Hardin (1968) has coined it, to the "tragedy of the commons".

When the property rights to the environment are specified in this manner, firms have no incentive to undertake pollution abatement measures. Rather market forces create an incentive for firms not to undertake abatement measures. As pollution abatement can involve substantial costs, any firm undertaking abatement measures may find itself at a competitive disadvantage with respect to firms that choose not to abate their pollution discharges.

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[1] While the discussion will focus on the pollution from industries, the same arguments will hold for pollution generated by municipalities or individual households.

4. MARKET-BASED INCENTIVES

An alternative to the traditional command and control approach to environmental regulation is the "market-based incentives" (MBIs) approach, now being greeted with new enthusiasm by many jurisdictions throughout the world[2]. The command and control regulatory approach has typically been an end-of-pipe approach under which governments have set limits on the quantities and types of wastes a firm is allowed to discharge or by mandating that specific control equipment be installed. On the other hand, MBIs attempt to intervene in the market to create the conditions for environmental improvement. They can take several forms, and can intervene in a production process at different stages. Examples of MBIs include:

- Discharge fees based on the volume and type of wastes discharged;
- Environmental excise taxes on products harmful to the environment;
- Deposit/refund systems; and
- Emissions trading programs.

Though command and control will continue as an approach to environmental regulation, arguments have been advanced that a more efficient allocation of both government and social resources would result from a greater use of MBIs. However, the merging of a large part of the current regulatory system with MBIs would require a significant change in attitude on the part of both government and industry. Pollution and its regulation would be treated primarily as an economic matter, though the regulatory system would still need to be medically and scientifically based. Various types of pollution would be treated as costs imposed on society in the form of depreciating natural capital, morbidity and mortality, aesthetic damage, and so on. As one economist has put it, regulation would then be about driving a "wedge" between economic activity and its impact on the environment.

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[2] The discussion of market-based incentives has been taken from the joint work of Resources Future International and the Institute for Research on Public Policy (1991) for the Canadian Council of Ministers of the Environment.

Because MBIs utilize market mechanisms, they should be superior to a command and control system in making product prices reflect true production costs. Economists distinguish between the internal costs of a firm - the expenses we encounter on the income statement - and "externalities" which lie outside of the firm's cost structure. Externalities are very much a part of the costs of production - the part that a firm or industry does not have to pay for but which falls on society. Industrial pollution has historically been treated as an externality.

"Internalities" and "externalities", together referred to as the "social costs" of production, should jointly determine product price (though, where monopoly elements exist, prices will still be distorted away from socially optimum norms).

However, externalities will not enter into price unless forced to do so by regulation. This is important because externalities are often major costs. When regulators force externalities into private cost structures by, for example, removing a perverse subsidy (e.g. support of chemically based farming) or by imposing a green tax (e.g. on carbon fuels), producer and consumer choice is placed on a more socially optimum footing (assuming, of course, that a clean environment is socially valued). Both producer and consumer must now decide if they want a product at the higher cost and price, or if they want as much of it as they had before. If the increase in the cost and price of a valued product is sufficiently large, it should encourage a search for new products and less costly methods of production.

It must be remembered that MBIs will not eliminate reliance on command and control regulation. Many of the environmental actions governments must take will continue to be of a non-market character, such as the development of parks or the protection of endangered species. As well, monopolized markets may be insensitive to price-based approaches, except in the long-run (e.g. tobacco, alcohol).

It must also be noted that an incentive-based approach would not reduce governments' regulatory responsibilities. As with command and control, governments would continue to set regulatory agendas, establish standards, and ensure compliance. In addition, the use of MBIs would not diminish the need for government support of research into pollution causes and effects.

As noted earlier, a discharge fee system which bases the fees on the volume and toxicity of wastes discharged is one such MBI. The fee system takes away the right to freely discharge wastes and, by attaching a price to waste discharges, causes dischargers to conserve environmental resources. The extent to which an individual firm will undertake abatement measures in response to a discharge-fee system will depend on the firm's cost of pollution abatement relative to the discharge fee.

5. OBJECTIVES OF A WASTE DISCHARGE PERMIT FEE SYSTEM

Two points must be clarified before discussing the potential objectives of a waste discharge permit fee system. First, the adoption of the polluter-pay principle does not imply that the Province would be selling the right to pollute. The principle does mean that polluters would be held accountable for the costs their activities impose on society.

Second, the use of a waste discharge permit fee system (as a market-based incentive mechanism) would not replace the current discharge permit system, but would act as a complement to the direct regulatory approach. In this way, the market-based incentive and the direct regulatory approaches to pollution control will be blended to achieve the benefits available from both. The major advantage of the direct regulatory approach is the relative certainty that the permittees will reduce their discharges. The major disadvantage is that there is no ongoing incentive for the permittees to reduce discharges below limits set by the permit. The major advantage of the economic incentive approach is that it will provide a dynamic ongoing incentive for permittees to reduce discharges. The fees also provide dischargers with an incentive to go beyond the minimum regulatory compliance requirements by rewarding dischargers who do so with lower costs. A disadvantage of the economic incentive approach is that there is no certainty that an individual permittee will undertake any specific reduction measures.

In the development of a new waste discharge permit fee system the Province could attempt to achieve one or more of the four following objectives.

- **To Improve Economic Efficiency in Resource Allocation** - The introduction of waste discharge fees will cause firms to take account of, or internalize, the costs their waste discharges impose on society. The fees will also promote the conservation of the environment's capacity to absorb pollutants. The degree to which the fees will help to achieve economic efficiency in the allocation of resources will depend on how closely the fees approximate the external costs associated with the discharges.

- **To Provide an Incentive to Reduce Waste Production** - By placing a price on the use of environmental resources, the fees will provide firms with an ongoing economic incentive to reduce their waste discharges. The degree to which a firm will reduce its waste discharges will be determined by the level of the fee relative to the firm's marginal cost of pollution abatement.

- **To Achieve Equity** - The discharge fees could be used to provide a more equitable sharing of the costs resulting from pollution in at least three ways. First, those causing pollution could be made to bear the costs of the damages resulting from their discharges. Second, the fees would promote inter-industry equity as those industries polluting the most would pay the most in fees. Third, the revenue derived from the fees could be used to compensate those suffering the effects of pollution.

- **To Recover Government's Regulatory Costs** - Revenue from discharge fees could be employed to raise the revenues needed to cover at least the administrative and operating costs of government waste management functions. These costs are directly attributable to waste discharges and could be recovered from the waste dischargers in accordance with the polluter-pays principle.

6. THE CURRENT WASTE DISCHARGE PERMIT FEE SYSTEM

The primary legislative tool for the control of pollution in British Columbia is the *Waste Management Act*, which came into force on June 25, 1982, and replaced the *Pollution Control Act of 1967*. The *Waste Management Act* established a strict liability for the discharge of wastes into the environment unless authorized by a waste management permit[3]. The management of the waste discharge permit system is the responsibility of the Environmental Protection Division of the Ministry of Environment, Lands and Parks and its decentralized system of Regional Environmental Protection Managers. Upon receipt of an application, a manager may issue a discharge permit subject to any "requirements for the protection of the environment that he considers advisable".

A separate permit is required for discharges to each environmental medium, (air, land and water) and for the storage of special wastes[4]. Thus, a firm could require a total of four waste permits for a single site. There are approximately 3,400 active waste permits broken down as follows:

- Air Emission Permits 31%
- Effluent Discharge Permits 43%
- Refuse Permits 25%
- Special Waste Storage Permits 1%

The requirement for a special waste storage permit has only recently been introduced, thus accounting for the small number of storage permitsapproved so

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[3] Section 3 (1.1) of the *Act* states "Subject to subsection (3) no person shall, in the course of conducting an industry, trade or business, introduce or cause or allow waste to be introduced into the environment." Section 3 (3) (a) allows the "disposition of waste in compliance with a permit, approval, order or the regulations, or with a waste management plan approved by the Minister." In this report, "permit" will be taken as including permits, approvals, orders, and waste management plans which authorize the discharge of wastes.

[4] Special wastes are defined as "those wastes which due to their nature and quantity are potentially hazardous to human health and/or require special disposal techniques to eliminate or reduce the hazard" (Ministry of Environment, Special Wastes Fact Sheet).

far[5]. The number of storage permits is expected to increase significantly over the next few years.

There are substantial costs incurred by the Ministry of Environment, Lands and Parks in the operation and management of the waste management permit system. A conservative estimate of the costs to administer the permit system is $15 million annually. These costs cover the functions of:

- processing and assessment of permit applications;
- monitoring of waste discharges and ambient environmental conditions;
- the periodic review of existing permits; and
- enforcement of permit requirements.

The *Waste Management Act* also contains a provision which allows for the collection of fees and costs from permit holders[6]. A waste discharge permit fee system was introduced on September 1, 1987, by the *Waste Management Fees Regulation*[7]. The regulation established an application fee and an annual fee for waste discharge permits payable when applying for a waste management permit. The application fee is the same amount as the annual fee for the permit for which an application is made. Currently, no fee is collected for a special waste storage permit. In addition, the regulation specifically exempts the following from the permit fees:

- permits held by the Provincial or Federal Governments;
- municipal refuse discharges; and
- domestic waste discharges on Indian Reserves.

The amount of the annual fee for a discharge permit is determined by three factors: the type of discharge permit (air emission, effluent or refuse discharge); the permittee's industrial classification; and the "capacity of the works". The industrial classification is based on StatisticsCanada's system of standard

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[5] The *Special Waste Regulation*, B.C. Reg. 63/88, under the *Waste Management Act* became effective on April 1, 1988.

[6] Section 33 of the Act states that permittees "... shall pay to the Crown, at the time and in accordance with the regulations, the fees and charges that are established by the regulations."

[7] *Waste Management Fees Regulation*, B.C. Reg. 304/87

industrial classifications (SIC).[8] However, the regulation uses its own system of industrial classifications where the SIC system is inappropriate. The regulation specifies a total of 119 industry groups of which 108 are SIC groupings and the remaining 11 are the other classifications (NC) developed for the purposes of the regulation.

The third factor in determining the permit fee, the "capacity of the works", is defined in two ways. For 100 of the 119 industry groups, it is defined as the actual production or processing capacity of the works and permit fees are based on level of production, not the quantity of wastes discharged. For example, as shown in Table 1, a pulp mill (SIC=2711) with a production capacity of 2,000 air dry unbleached tonnes per day would pay an annual fee of $20,000 for an air emission permit, $15,000 for an effluent permit, and $10,000 for a refuse permit regardless of the actual volume and relative toxicity of the discharges.

For the other 19 industry groups (which includes municipalities), the capacity of their works is defined as the maximum volume of discharges authorized by the permit or the actual discharge level, if known. However, for this latter group, the fees are based on the volume of material discharged alone, in m^3 per day or minute, and not on the strength of the contaminants contained in the discharges. Thus, the fees for this second group are not based on the total pollutant loadings (ie. volume x concentrations) authorized by the permit. For example, as shown in Table 1, a placer mine (NC=0006) authorized to discharge 10,000 m^3 per day of waste would pay an annual fee of $1,600 for an air emission permit, $1,200 for an effluent permit, and $800 for a refuse permit regardless of the concentration of the pollutants contained within the discharge volume.

In addition, as shown in Table 1, the permit fees increase in a block rate, or stepped, fashion. Within a given capacity block, the fee remains constant. The table also shows that the fee for an air emission permit relative to an effluent permit relative to a refuse permit was established using a ratio of 4:3:2. At the time the permit fee regulation was drafted, these ratios were felt to be representative of the relative cost of administering the different permit types. The maximum permit fee is $24,000, for an air emission permit for a pulp mill, and the minimum fee is $50 for a refuse permit for a dozen different industry groups.

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[8] The classification has been done at the four digit level.

TABLE 1

EXAMPLES OF WASTE MANAGEMENT PERMIT FEES FOR INDUSTRY GROUPINGS

SIC = 2711 to 2712: Pulp and Newsprint Industry

Capacity	Permit Type ($)		
ADUt/day	Air	Effluent	Refuse
0-499	4,000	3,000	2,000
500-999	8,000	6,000	4,000
1,000-1,499	12,000	9,000	6,000
1,500-1,999	16,000	12,000	8,000
2,000-2,499	20,000	15,000	10,000
2,500+	24,000	18,000	12,000

SIC = 2512: Saw and Planing Mill Products Industry

Capacity	Permit Type ($)		
Mfbm/day	Air	Effluent	Refuse
0-49	200	150	100
50-99	400	300	200
100-199	800	600	400
200-299	1,600	1,200	800
300-399	2,400	1,800	1,200
400-499	3,200	2,400	1,600
500-599	4,000	3,000	2,000
600-699	4,800	3,600	2,400
700-799	5,600	4,200	2,800
800-899	6,400	4,800	3,200
900-999	7,200	5,400	3,600
1,000+	8,000	6,000	4,000

NC = 0006: Placer Mines

Capacity	Permit Type ($)		
m^3/day Waste	Air	Effluent	Refuse
0-99	400	300	200
100-999	800	600	400
1,000-9,999	1,200	900	600
10,000-99,999	1,600	1,200	800
100,000+	2,000	1,500	1,000

Source: *Waste Management Fees Regulation*, B.C. Reg. 304/87 .
ADUt - air dry unbleached tonnes per day.
Mfbm - thousand board feet measure.

7. THE NEED FOR CHANGE

It would be instructive at this point to see how effectively the current permit fee system meets the four objectives of an ideal discharge fee system outlined earlier - economic efficiency, economic incentive, equity and cost recovery. On this basis the potential need for changing the current system can be assessed.

Economic Efficiency

For discharge fees to correct the economic inefficiency created by the waste discharges, the fees would have to be set to include all costs to society associated with the discharges. The costs should include not only government regulatory costs but also the costs of any environmental damages, the costs of any human health injuries, plus the collection of a resource rent for the use of the natural assimilative capacity of the receiving environment. Since the current fee system collects only a portion of the government's regulatory costs, and none of the other costs, the fees make only a small contribution towards economic efficiency.

Economic Incentive

For most industries whose "capacity" is based on some fixed level of production, the fees provide no incentive to reduce waste discharges because the fees are not linked to the quantity and quality of their waste discharges. For the 19 industry groups whose capacity is based on the maximum permitted volume of discharges, the fees provide only a limited incentive to reduce discharges. As shown in Table 1 for placer mines, the fees increase in a block rate fashion, providing no incentive to reduce waste discharges within a given block level. Generally, as the block rates increase, the average fee per unit volume of waste discharged declines. For example, Table 2 shows the total and average fee for a waste disposal operation's effluent permit (NC=0002). While the total fee increases between blocks, the average fee begins to decline, then starts to rise and finally drops off quickly; thus, there is little incentive for large dischargers to reduce their volume of discharges. In addition, because the fees for this latter group are based only on the volume of their discharges and not on

TABLE 2

TOTAL AND AVERAGE FEES FOR AN EFFLUENT PERMIT FOR A WASTE DISPOSAL OPERATION (NC = 0002)

Capacity (m^3 of waste/day)	Total Fees ($)	Average Fee ($/$m^3$/day)
1	75	75.00
50	150	3.00
100	300	3.00
150	450	3.00
200	900	4.50
250	1,800	7.20
500	2,700	5.40
1,000	3,600	3.60
1,500	4,500	3.00
2,000	5,400	2.70
5,000	6,300	1.26
10,000	7,200	0.72
15,000	8,100	0.54
20,000	9,000	0.45
25,000	9,900	0.40
30,000	10,800	0.36
50,000	11,700	0.23
100,000	12,600	0.13

TABLE 3

AVERAGE FEES PER UNIT OF CAPACITY FOR THE PULP AND NEWSPRINT INDUSTRY

Capacity (ADUt/Day)	Permit Type		
	Air	Effluent ($)	Refuse
1	4,000.00	3,000.00	2,000.00
500	16.00	12.00	8.00
1,000	12.00	9.00	6.00
1,500	10.67	8.00	5.33
2,000	10.00	7.50	5.00
2,500	9.60	7.20	4.80

the concentration of pollutants within the discharges, the current system, rather perversely, provides an incentive for a firm to reduce the volume of their discharges by increasing the concentration of their discharges (provided that this was permissable under their permit conditions).

Equity

The equity of the current system will be examined by comparing the treatment of discharges within and between different industry groups. Table 3 lists the average fee per unit of capacity for the pulp and newsprint industry. While Table 2 shows that the block rates for fees increase as production increases, Table 3 shows that the average fee per unit of production falls off very quickly. This declining average fee per unit of capacity can only be viewed as being equitable if the quantity of pollutants discharged per unit of capacity also falls as total capacity increases. It is not obvious that this condition can be said to exist. In addition, the fee levels between industry groups were set rather arbitrarily but attempted to reflect an intuitive understanding of the relative costs of administering a permit between industry groups. Nevertheless, the production processes which change over time will necessitate periodic revision of the relative inter-industry fee levels.

The current fees for municipal effluent permits (NC=0002) are particularly inequitable. Consider two municipalities discharging the same volume of effluent; one municipality undertakes tertiary treatment of its effluent while the other discharges raw untreated sewage. Under the current system both municipalities would pay exactly the same fee even though the municipality undertaking tertiary treatment would be discharging far fewer pollutants than the municipality discharging raw sewage. Thus, the current system fails to recognize or reward municipalities who upgrade their standard of sewage treatment. In addition, the maximum fee placed on municipal effluent permits means that large municipalities will pay a far smaller per capita fee than small municipalities. For example, the City of Armstrong pays an annual effluent fee of $4,500 per year, or $1.66 per capita, while the Greater Vancouver Regional District pays an annual effluent fee of $50,400, or $0.04 per capita.

Cost Recovery

The current fee system recovered only about 27 per cent of the permit system's total regulatory costs in the 1990/91 fiscal year. Thus, the current fee system is serving only as a partial cost-recovery mechanism.

Conclusion

This review of the current waste management fee system has revealed that it fails to meet or only partially meets each of the four objectives of an ideal waste discharge permit fee system. Thus, there is an urgent need to revise the current fee system.

8. EXAMPLES OF FEE SYSTEMS USED BY OTHER JURISDICTIONS

Waste discharge fee systems are not new. They have been used extensively by other jurisdictions in both Europe and the United States. Examples of currently operating fee systems are reviewed below.

Effluent Discharge Fees

The national effluent fee systems employed by three European countries, France, the Netherlands and West Germany, are reviewed below. Further details of each country's effluent fee systems can be found in Stone (1990).

France introduced its effluent fee system in 1969. At that time the country was divided into six river-basin authorities which autonomously set the fees for pollutant discharges within each river basin to cover water management costs for each year. The fees are presented in Table 4. The variation in the fees between river basins and between pollutant types reflects the concern each basin has about the various pollutants and the basin's management costs associated with each pollutant. For large waste dischargers the fees are assessed based on actual waste discharge monitoring data. To minimize monitoring costs, the fees for small dischargers are based on industry coefficients which express effluent discharges per unit of production or per employee.

The Netherlands introduced its effluent fee system in 1970. As in France,

TABLE 4
EFFLUENT CHARGES FOR FRANCE'S RIVER BASIN AGENCIES, 1985
(Dollars per Kilogram per Day)

RiverBasin Agency	Suspended Solids SS	Oxidizable Matter OM	Toxic Substances* TS	Nitrates N	Phosphates P	Soluble Salts SALT
Adour-Garonne	10.67	16.53	253.33	13.04	3.69	——
Artois-Picardie	10.22	20.45	317.80	3.14	——	——
Loire-Bretagne	16.16	19.34	366.65	14.16	46.31	——
Rhin-Meuse	10.51	21.02	320.16	10.51	——	26.15**
Rhône-Mediterranée-Corse	11.30	33.89	355.94	——	147.28	——
Seine-Normandie	14.24	28.49	303.45	23.24	——	291.10***

*per kilogram equitox per day
** per Mho per day
*** per (Mho/cm) x m^2 per day
Source: Bongaerts and Kraemer, 1989.

the Netherlands has divided the country into local water management areas which independently set effluent fees for discharges within each area to recover the total costs of the area's water management activities. Again, as in France, the Netherlands bases the total fees assessed on actual measurements of discharges for large waste dischargers and on industrial coefficients for smaller dischargers. Quantities of effluent discharged are measured in units known as population equivalents; a population equivalent is the average amount of effluent discharged by each inhabitant in the local water management area. Industrial discharges are also converted to population equivalents, using various formulas, for the calculation of their charges. In 1984, the fee for the discharge of a population equivalent varied among local water management areas, according to their water management costs, from a high of 86 Dutch Guilders to a low of 33.12 Dutch Guilders (approximately $50.57 to $19.47) (Bongaerts and Kraemer, 1989).

West Germany introduced its national effluent fee system in 1981. The fees are based on the quantity of wastewater discharged and on the wastewater's "noxiousness" (quality). The determination of the noxiousness of the effluent is based on the quantity of six pollutants contained in the effluent: settleable solids, oxidizable substances, mercury, cadmium, and toxicity to fish. The quantity of pollutants on which the fee is assessed is based not on actual measurements of the wastes discharged by a permittee but rather on the quantity of wastes the discharge permit authorizes. The maximum fee rate was established to approximate the average purification cost of an average-size wastewater treatment plant designed for full biological purification (Reese, 1983). However, the fees were phased in to the maximum rate over a five-year period to give waste dischargers time to make any adjustments to the new fee system. For example, the fee per tonne of oxidizable substances discharged was fixed at $63.80 in 1981, and rose in yearly increments to $255.70, the maximum rate, in 1986.

Significant results have been achieved by effluent control strategies which included discharge fees. For example, the Netherlands achieved an 89% reduction in discharges of oxygen-consuming discharges over 15 years. Industrial discharges decreased by over 70% from 33.0 million population equivalents (p.e.) in 1969, to only an estimated 9.7 million p.e. in 1985. The reduction in industrial discharges is attributed to increased in-plant treatment of wastes and the improved housekeeping measures undertaken by firms to comply with their discharge permits and to reduce their effluent fee payments. At the same time, the treatment

of waste waters at public treatment plants increased by over 350%, from 5.5 million p.e. in 1969, to an estimated 19.5 million p.e. in 1985.

In addition, the revenues collected by the European effluent fee systems can be quite substantial. For example, The Netherlands' effluent fee system collected revenue, in U.S. dollars, of approximately $20 million in 1971, $140 million in 1979, and $300 million in 1980 (Bressers, 1983).

Air Emission Fees

A good example of an air emission fee system is the one employed by California's South Coast Air Quality Management District, which comprises portions of the Counties of Los Angeles, Orange, Riverside and San Bernadino. The State gave the District the responsibility for comprehensive air pollution control in California's south coast air basin. The goal of the District is to develop and implement a basin air management plan for attaining the U.S. federal air quality standards.

California state law authorizes the District to "adopt fee schedules for the issuance of variances and permits to cover the cost of planning, inspection, and monitoring related thereto." Under this authority the District has imposed three fee groups: administration fees, annual operating permit fees, and annual emission fees. The administration and annual operating permit fees are based on the level of service and the complexity of the equipment for which a permit application is made. The administration fees ranged from $180 to $28,100 for the 1990/91 fiscal year, and the annual operating permits ranged from $150 to $1,200.

The District has also levied emission fees since 1978, and bases the fees on the total weight of the pollutants emitted annually by a permit holder. Permit holders are required to report their emissions for the previous calendar year using emission factors supplied by the District.[9] Tables 5 and 6 list the pollutants for which fees are currently charged. For the pollutants listed in Table 5, annual

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[9] Emission factors are the amount of air contaminants emitted per unit of time or per unit of material handled, processed or burned.

TABLE 5

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
EMISSION FEES, 1990

(U.S. $ per ton emitted)

Pollutant Type	Total Annual Emission Range			
	4-25 tons	>25-75 tons	>75 tons	>100 tons
Organic Gases[a]	245	398	596	n.a.
Specific Organics[b]	44	70	105	n.a.
Nitrogen Oxides	141	228	343	n.a.
Sulphur Oxides	171	275	413	n.a.
Carbon Monoxide	n.a.	n.a.	n.a.	3.10
Particulate Matter	188	304	456	n.a.

Source: South Coast Air Quality Management District, Rule 301, 1990.

a. Excludes the ozone depleting substances listed in Table 4-5.

b. Includes trifluoromethane, dichlorotrifluoroethane (HCFC-123), tetrafluoroethane (HFC-134a), dichlorofluoroethane (HCFC-141b), and chlorodifluorethane (HCFC-142b).

n.a. - not applicable.

TABLE 6

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT TOXIC CONTAMINANTS AND OZONE DEPLETERS EMISSION FEES

Pollutant Type	Fee (U.S. $ per lb.)
Toxic Compounds	
Asbestos	1.20
Benzene	0.72
Cadmium	1.20
Carbon Tetrachloride	0.72
Hexavelant Chromium	1.20
Chlorinated Dioxins and Dibenzofurans	1.20
Ethylene Dibromide	0.72
Ethylene Dichloride	0.72
Ethylene Oxide	0.72
Methylene Chloride	0.19
Ozone Depleters	
Chlorofluorocarbons (CFCs)	0.16
1,1,1-Trichloroethane	0.03

Source: South Coast Air Quality Management District, Rule 301, 1990.

emissions of less than 4 tons (100 tons for carbon monoxide) are not assessed a fee. The fee rates for the pollutants listed in Table 5 (except carbon monoxide) progressively increase as a permit holder's total annual emissions increase. Table 6 lists the District's fees for toxic contaminant and ozone depleter emissions.

Solid Waste Discharge Fees

Solid waste management has become a critical issue in many areas of the world. Nowhere, perhaps, has the situation become as severe as it has in the United States, particularly on its eastern seaboard. For example, New York State estimates that all existing state landfills will be full and closed by 1995 (New York, 1988). Many communities on the U.S. eastern seaboard now have to have their wastes trucked out of state for disposal at a cost which can exceed $100 per ton. In response, many U.S. states have pursued policies and legislation aimed at reducing their solid waste stream by implementing recycling, resource recovery, and source reduction measures. To fund their new solid waste management programs some states have turned to state tipping fee surcharges at solid waste disposal facilities in order to provide the necessary revenues. These surcharges serve as a type of solid waste discharge fee. The surcharges and fees implemented by several U.S. states are examined below.

Table 7 provides a summary of the solid waste disposal fees and taxes imposed by nine U.S. states. The fees currently range from $0.20 per ton in Louisiana to $4.00 per ton in Maine. Three of the states only collect the fees from landfill sites while the remainder include other waste disposal facilities such as incinerators or resource recovery facilities within their fee system. Most of the states have imposed their solid waste fees to pay for solid waste management programs but two states, Ohio and Colorado, have imposed solid waste fees to fund part of their hazardous waste management costs, in particular the cleanup of contaminated sites. All of the solid waste fees reviewed have their revenue deposited to a dedicated solid or hazardous waste management account, or are credited directly to a state department for the funding of each state's solid waste management program.

TABLE 7

A SUMMARY OF SOLID WASTE DISCHARGE FEES AND TAXES IN THE UNITED STATES

(U.S. dollars)

Jurisdiction	Year Introduced	Rate	Annual Revenue (millions)
New Jersey	1982	0.12/cu. yd.	4.6
	1987	1.50/ton	15.0
Minnesota	1985	0.50/cu. yd.	1.8 (1988/89)
	1990	2.00/cu. yd.	-
Colorado	1986	0.15/cu. yd.	1.7
Illinois	1987	0.95/ton	16.2
	1989	1.27/ton	18.7
Ohio	1988	0.50-0.75/ton	-
	1989	1.00-1.25/ton	-
	1990	1.50-1.75/ton	-
Pennsylvania	1988	2.00/ton	-
California	1990	0.50/ton	-
	1991	1.00/ton	-
Louisiana	1990	0.20/ton	-
Maine	1990	4.00/ton	-

Source: Stone (1990).

Other features of U.S. solid waste disposal fees at the state level include:

- several states give local governments the power to impose fees on disposal facilities located within the local government's boundaries;
- to recognize the administrative costs of collecting the fees some states allow facility operators to retain a percentage of the fees if payments by the facilities are remitted on time;
- two states, Illinois and Minnesota, provide exemptions for waste residues from recycling, resource recovery and energy-from-waste facilities provided the facility reduces the volume of its throughput by a minimum of 50% and 85% respectively;
- one state, Ohio, varies its fees according to the location from which the wastes originate relative to the disposal facility; and
- Maine imposes a further surcharge on wastes from municipalities that are not meeting the state's waste reduction goals.

9. PROPOSALS FOR REVISING THE DISCHARGE PERMIT FEE SYSTEM

The Ministry's proposal for revising the fee system has been developed based on the principles of equity, polluter pay, cost recovery and reinvestment of fee revenue in environmental programs targeted to reduce pollution.

- Equity: the same formula should be used to calculate the waste discharge permit fees for all waste dischargers, industrial or municipal. Equity also implies that permittees discharging similar types and quantities of wastes should have similar fees.

- Polluter Pay: basing a permittee's fees on the volume and toxicity[10] of its discharges will ensure that the more a permittee pollutes the more it will pay. In addition, the fee for each type of pollutant discharged must vary according to some measure of the relative environmental risk.

- Cost Recovery: basic fee revenues would at least be used to pay the costs of permit administration. Fees could be raised beyond administrative cost levels to increase the economic incentive to decrease pollution.

- Reinvestment: surcharge fee revenues derived from waste discharge permit fees would be used to address environmental problems. These fees would be dedicated to the Sustainable Environment Fund to fund projects such as research for the control and treatment of forest product wastewater and the demonstration of new technologies for collection, treatment and disposal of municipal wastes.

The remainder of this section provides the Ministry's proposal to revise the current fee system in accordance with the principles listed above. Readers should keep in mind that the proposals presented here are just that, proposals, and that no final decision will be taken prior to the receipt, analysis and consideration of all comments from interested individuals, groups and organizations. However, it is the Ministry's intention to implement a new fee system on July 1, 1992.

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[10] Toxicity as used in this report refers to the noxiousness (quality) of the wastes discharged.

Components of the Discharge Permit Fee

It is proposed that the revised discharge permit fee have a two part structure: a fixed fee component (FF), and a variable fee component (VF). Thus, the total fee (TF) for each discharge permit would be calculated as:

$$TF = FF + VF.$$

The Fixed Fee Component

This component would represent the base amount required to cover the minimum administrative costs of maintaining any discharge permit regardless of the permit's authorized level of discharges. It is proposed that the fixed fee component for each discharge permit type be equal to the minimum fee charged under the current permit fee system, which for each permit type is:

- air emission permit $100.00
- effluent discharge permit $75.00
- refuse permit $50.00

The Variable Fee Component

The variable fee component would, in most cases, be the major part of the total permit fee and would be based on the quantity and type of pollutants a permittee discharged (each year). The quantity of pollutants discharged will be determined by the maximum quantity of waste discharges authorized by the permit, or by a regulation issued under the *Waste Management Act*, or on the permittee's actual discharges based on data submitted by a permittee and approved by the Regional Environmental Protection Manager. A fee for each type of pollutant will be developed, as discussed below, based on the relative environmental impact of each type of pollutant discharged. Thus, the variable portion of the fee would be calculated as the sum of the quantity of each type of pollutant discharged multiplied by the fee for each pollutant type. Stated mathematically, the variable portion of the fee would be calculated as:

$$VF = \sum_{i=1}^{n} PF_i \times Q_i$$

where:
- VF = total variable fee for a permit;
- PF_i = the fee per unit of pollutant type i;
- Q_i = the annual quantity of pollutant type i that a permit holder is authorized to discharge;
- i = pollutant type; and
- n = the total number of pollutant types.

Pollutant Fees

Within each discharge medium (air, water and land), the fees for each type of pollutant discharged should be based on the relative damage each pollutant may potentially cause to the environment. For example, if air emissions of total reduced sulphur (TRS) potentially cause thirty times more damage than air emissions of particulate matter, then the fee for a unit of TRS discharged should be thirty times greater than the fee for a unit of particulates discharged. It is proposed that the provincial ambient air and water quality objectives and pollution control objectives be used to determine the relative weights assigned to each pollutant type discharged to air or water. Appendix A discusses in more detail the proposed method of determining the relative environmental impact of each pollutant.

Using the relative environmental impact weights described above, the fees for each pollutant type can be calculated so as to recover whatever annual revenue target is deemed to be appropriate. Based on the current fee revenue level of $4.1 million, then Tables 8, 9 and 10 represent the estimated schedules of pollutant fees for air emissions, effluent discharges and refuse discharges which would be required to achieve this target.

Discharge Factors

Where a permit does not specify the concentration of contaminants contained within the permit's authorized discharges, the Ministry proposes that the discharge factors listed in Tables 11 and 12 be used in the

TABLE 8

AN EXAMPLE OF POLLUTANT FEES FOR AIR EMISSION PERMITS

POLLUTANT TYPE	FEE PER TONNE EMITTED ($)
Total Particulate	2.70
Sulphur and Sulphur Oxides	2.10
TRS	90.00
Nitrogen Oxide	1.80
Chlorine and Chlorine Oxides	1.80
Hydrogen Chloride	1.80
Ozone	10.80
Carbon Monoxide	0.08
Ammonia	2.70
Hydrocarbons	2.70
Phenols	2.70
Fluorides	108.00
Metals	108.00
Asbestos*	2.70
Special Wastes Not Otherwise Specified	108.00
Other Pollutants Not Otherwise Specified	2.70

* Fee per 5 cubic metres of air emissions per minute at a concentration of 2 fibres per cubic centimetre.

TABLE 9

AN EXAMPLE OF POLLUTANT FEES FOR EFFLUENT PERMITS

POLLUTANT TYPE	FEE PER TONNE DISCHARGED ($)
Suspended Solids	2.20
Other Solids	2.20
BOD	3.30
Oil and Grease	11.00
Other Petroleum Products	11.00
Surfactants	11.00
Ammonia	16.50
Nitrogen and Nitrates	6.60
Chlorine	44.00
AOX	44.00
Phenols	44.00
Phosphorous and Phosphates	16.50
Sulphates	0.65
Sulphides	44.00
Arsenic	44.00
Metals	44.00
Cyanide	44.00
Fluoride	16.50
Special Wastes Not Otherwise Specified	44.00
Other Pollutants Not Otherwise Specified	2.20
Toxicity*	2.40/unit

*Toxicity units are determined using the formula given below. Appendix A describes how the formula was derived. LC_{50} is the percentage of effluent by volume in which 50% of the test fish survive for a specified time.

Toxicity Units = (Avg. Daily Flow / 20) x (100 - LC_{50}) / 100

TABLE 10

AN EXAMPLE OF POLLUTANT FEES FOR REFUSE PERMITS

Fee per Tonne of Industrial Refuse	$0.10
Fee per m^3 of the average amount of Mining Rock Waste currently permitted per day	$1.00

calculation of the annual discharge fee. For example, if a domestic sewage effluent permit did not specify the type and concentration of the contaminants within the effluent, then the annual fee would be based on the factors listed in Table 12, i.e. 130 mg./l. of BOD (biological and chemical oxygen demand) and 130 mg./l. of suspended solids. For air emission permits that did not specify the allowable contaminants from the combustion of fuels, the emission factors in Table 11 would be used. For example, the fee for a modified wood waste burner would be based on the quantity of wood waste burned multiplied by the emission factors used to calculate the annual discharges of pollutants from the burner (listed in Table 11).

Reporting Requirements

In cases where the discharge permit or a regulation under the *Waste Management Act* authorizes the discharge of pollutants at a specified rate per unit of production, or where the quantity of pollutants discharged is calculated using the discharge factors specified in Tables 11 and 12, it would be necessary for the permittee to provide the Ministry with the production or other process data required to calculate the annual discharge fee. For example, if the permit authorizes the discharge of BOD in pulp mill effluent at a rate specified in kilograms of BOD per tonne of pulp produced then the permittee would be required to provide the Ministry with the mill's total annual production of pulp.

Mining Operation Permit Fee Adjustments

Adjustments to the overall permit fee system were considered necessary for the mining industry due to the unique characteristics of certain segments of the industry. For example, the conditions set in effluent permits for surface coal mines deal mainly with the large volume of surface water run-off that occurs during the spring. It would be inappropriate to treat this run-off water in the same manner as process effluent. Based on the current level of permit fee revenues, the Ministry proposes the following adjustments:

- The base fee for an effluent permit would be set at $400.00.
- The variable fees for mine refuse permits for rock waste and overburden would be calculated using a unit fee of $1.00 per cubic meter of the average amount of mining rock waste currently permitted per day.

TABLE 11

PROPOSED DISCHARGE FACTORS FOR AIR EMISSION PERMITS

Type of Emission	Parameter	Discharge Factor (Kg. per Unit)	Units
Natural Gas Combustion	Particulate	48.1	1,000,000 m^3
	SO_x	9.6	1,000,000 m^3
	NO_x	2,242.6	1,000,000 m^3
	Hydrocarbons	22.4	1,000,000 m^3
	Carbon Monoxide	560.7	1,000,000 m^3
Coal Combustion	Particulate	3.15	Tonnes
	SO_x	17.5	Tonnes
	NO_x	3.75	Tonnes
	Hydrocarbons	0.035	Tonnes
	Carbon Monoxide	0.3	Tonnes
Oil Combustion Grades 1 & 2	Particulate	0.2	1,000 Litres
	SO_x	17.2	1,000 Litres
	NO_x	2.9	1,000 Litres
	Hydrocarbons	0.02	1,000 Litres
	Carbon Monoxide	0.6	1,000 Litres
Oil Combustion Grade 4	Particulate	0.8	1,000 Litres
	SO_x	18.0	1,000 Litres
	NO_x	5.0	1,000 Litres
	Hydrocarbons	0.1	1,000 Litres
	Carbon Monoxide	0.6	1,000 Litres
Oil Combustion Grade 5	Particulate	1.2	1,000 Litres
	SO_x	19.1	1,000 Litres
	NO_x	5.0	1,000 Litres
	Hydrocarbons	0.1	1,000 Litres
	Carbon Monoxide	0.6	1,000 Litres
Oil Combustion Grade 6	Particulate	1.6	1,000 Litres
	SO_x	19.1	1,000 Litres
	NO_x	5.0	1,000 Litres
	Hydrocarbons	0.1	1,000 Litres
	Carbon Monoxide	0.6	1,000 Litres

TABLE 11 CONTINUED

Type of Emission	Parameter	Discharge Factor (Kg. per Unit)	Units
Wood Combustion	Particulate	900.0	1,000 m^3
Power Boiler	SO_x	31.25	1,000 m^3
	NO_x	85.0	1,000 m^3
	Hydrocarbons	175.0	1,000 m^3
	Carbon Monoxide	500.0	1,000 m^3
Wood Combustion	Particulate	900.0	1,000 m^3
Wood Waste Burner	SO_x	12.5	1,000 m^3
	NO_x	125.0	1,000 m^3
	Hydrocarbons	1,375.0	1,000 m^3
	Carbon Monoxide	16,250.0	1,000 m^3
Wood Combustion	Particulate	1,625.0	1,000 m^3
Trench Burner	SO_x	12.5	1,000 m^3
	NO_x	500.0	1,000 m^3
	Hydrocarbons	1,375.0	1,000 m^3
	Carbon Monoxide	16,250.0	1,000 m^3
Wood Combustion	Particulate	2,125.0	1,000 m^3
Open Burning	SO_x	12.5	1,000 m^3
	NO_x	500.0	1,000 m^3
	Hydrocarbons	2,375.0	1,000 m^3
	Carbon Monoxide	17,500.0	1,000 m^3
		(mg. per Unit)	
Refuse Incinerator	Particulate	230	m^3 of stack flow
		(mg. per Unit)	
Industrial Wire Burner	Particulate	230	m^3 of stack flow
Bulk Petroleum Storage Fixed Roof Tanks	Hydrocarbons	1,473.9	Million litres storage capacity
Bulk Petroleum Storage Floating Roof Tanks	Hydrocarbons	503.3	Million litres storage capacity

TABLE 12

PROPOSED DISCHARGE FACTORS FOR EFFLUENT PERMITS

Type of Effluent	Parameter	Discharge Factor
Septic Tank and Other Sewage Effluent	BOD, mg./l.	130.0
	Suspended Solids, mg./l.	130.0
Gravel and Aggregate Washing Effluent	Suspended Solids, mg./l.	100.0
Placer Gold Gravel Washing Effluent	Suspended Solids, mg./l.	100.0
Meat and Poultry Processing Plant Effluent	BOD, mg./l.	130.0
	Suspended Solids, mg./l.	130.0
Fish-processing Plant Effluent	BOD, mg./l.	100.0
	Suspended Solids, mg./l.	70.0
Milk-processing Plants	(Effluent Discharges per Product)	
Milk	BOD, kg./tonne product	0.23
Butter	BOD, kg./tonne product	3.8
Cottage Cheese	BOD, kg./tonne product	2.5
Natural Cheese	BOD, kg./tonne product	1.0
Ice Cream	BOD, kg./tonne product	0.25
Condensed Milk	BOD, kg./tonne product	0.38
Dry Whole Milk	BOD, kg./tonne product	1.13
Dry Skim Milk	BOD, kg./tonne product	1.5
Fruit and Vegetable Processing Effluent	BOD, kg./tonne raw material	0.6
	Suspended Solids, kg./tonne raw material	0.5
Egg Packing Plants	BOD, kg./1,000 dozen eggs	0.04
	Suspended Solids, kg./1,000 dozen eggs	0.04
Egg Processing Plants	BOD, kg./1,000 dozen eggs	0.18
	Suspended Solids, kg./1,000 dozen eggs	0.18
Soft-drink Bottling Plants	BOD, kg./1000 cases of product	0.9
	Suspended Solids, kg./1000 cases of product	0.9
Breweries	BOD, kg./1000 l. of beer	2.8
	Suspended Solids, kg./1000 l. of beer	2.8

TABLE 12 CONTINUED

Type of Effluent	Parameter	Discharge Factor
Distilleries	BOD, kg./tonne of absolute alcohol	0.5
	Suspended Solids, kg./tonne of absolute alcohol	0.3
Fish Farm and Hatchery Effluent	BOD, mg.l.	10.0
	Suspended Solids, mg.l.	10.0
	Ammonia, mg.l.	1.5
	Nitrate, mg.l.	0.4
	Phosphorous, mg.l.	0.2
Laundromat Effluent	BOD, mg./l.	50.0
	Suspended Solids, mg./l.	50.0
	Oil and Grease, mg./l.	15.0
	Surfactants, mg./l.	5.0
Car and Truck Wash Operation Effluent	BOD, mg./l.	25.0
	Suspended Solids, mg./l.	25.0
	Oil and Grease, mg./l.	15.0
	Surfactants, mg./l.	5.0
Ready Mix Concrete Truck Washout Effluent	Suspended Solids, mg./l.	50
Machinery, Equipment and Supplies Wholesale	Oil and Grease, mg./l.	70.0
Metal Ores Processing Effluent	Total Dissolved Metals, mg./l.	1.5
Plywood and Veneer Plant Effluent	BOD, mg./l.	60
	Suspended Solids, mg./l.	50
	Oil and Grease, mg./l.	10
Petroleum Bulk Storage Plant Effluent	Oil and Grease, mg./l.	5
	Suspended Solids, mg./l.	20

- The variable fee for a coal mine's effluent permits would be calculated based on the quantity of coal processed multiplied by the unit fee of $1.00 per thousand tonnes of coal processed in a year.

Municipal Effluent Permit Fee Adjustments

The Ministry proposes that the fees for municipal effluent permits for domestic sewage be based only on the quantity of BOD and suspended solids contained in the effluent. In cases where domestic sewage effluent is discharged by a municipality to an exfiltration pond, tile drainage system or land irrigation system that has been approved by a Regional Environmental Protection Manager, the variable fee would be reduced to 10 per cent of the usual rate.

The inequitable differences in per capita impact of fees between large metropolitan centres and smaller communities should be substantially reduced.

Municipal Refuse Permits

The current regulation exempts municipal refuse permits from the annual discharge permit fees. The Ministry proposes to extend the current exemption until December 31, 1995 to accommodate local government development of solid waste plans and solid waste user-pay strategies. Thereafter, annual discharge fees will apply to all municipal refuse permits except in communities where the Minister has approved a solid waste plan which outlines:

1) the community's current initiatives and proposed commitments to achieve a 50% reduction in solid waste by the year 2000;
2) volume based solid waste user-pay strategies.

This proposal reflects the Ministry's commitment to promoting recycling and composting programs, and to adjusting consumer purchasing decisions. In addition, encouragement of volume-based garbage collection and disposal systems will provide waste generators with economic incentives to reduce waste production and allocate the true costs of services to those who use them rather than spreading the costs throughout the municipal tax bill.

Municipal Collection of Permit Fees

The trend to devolve to local governments more responsibility for environmental protection may allow for those municipalities who so choose to administer permits in their jurisdiction. This would include the collection of discharge fees and the use of the revenues. Administrative mechanisms, such as audits, will be needed to ensure that the four basic principles of the new fee system are followed for those municipalities who may select this option. This would include ensuring that discharge fee revenues are reinvested in environmental initiatives.

Discharges Not Requiring Permits

Authority may be sought to allow for certain classes of dischargers to no longer be required to have a permit. For example, it may not be prudent to require small dischargers, asphalt operations, laundromats, dog kennels, and trout farms to have a permit and pay fees.

Potential Impact of the Revised Fee System

By basing the fees on the quantity and type of pollutants discharged the proposed fee system will shift the burden of the fees onto large-scale waste dischargers and away from small waste dischargers. Thus, the permit holders who discharge the most will see fee increases while many permit holders who discharge small quantities of pollutants will receive fee reductions. The Ministry believes that the proposed revisions will address the inequities in the current fee system.

10. OTHER FEES

In keeping with the principles of equity, polluter pay, cost recovery and reinvestment of revenue, the Ministry proposes to amend the current permit application fees and introduce fees for waste discharge approvals, and, as a further economic incentive, to levy surcharge fees.

Application Fees

The Ministry proposes that the rule for determining permit application fees remain the same as under the current fee system. That is, the application fee would be the same as the annual discharge fee for the permit for which an application is made.

Amendment Fees

Under the current fee system, no fee is collected for an application to amend a permit despite the fact that processing a permit amendment application may require as much work as processing a new permit application. The Ministry proposes that a fee for an application to amend a permit be introduced. The fee would be calculated in the same manner as new permit applications, but only the increase in discharges applied for above the permit's current authorized discharge level would be included in the calculation of the fee. No fee would be collected for an amendment application which would lower the permittee's authorized discharge quantity.

Approval Fees

Under Section 9 of the *Waste Management Act*, a Regional Environmental Protection Manager can issue an "approval" for the introduction of wastes into the environment, for a period of up to 15 months, without the issuance of a permit. Under the current fee system no fee is collected for the issuance of an approval. The Ministry now proposes to introduce an approval fee which will be calculated in the same manner as the annual discharge permit fees. The approval fee would be due at the time of application for the approval and would be based on the quantity and toxic nature of the pollutants authorized to be discharged over the period for which the approval is granted.

BACT Surcharge Fees

Surcharge fees would be levied as an economic incentive for existing industrial operations to utilize Best Available Control Technology (BACT).[11] This policy would be applied as follows:

- An existing discharger would be required to enter into a contract with the Ministry agreeing to phase-in BACT over a five to seven year period.

- At the end of the agreed phase-in period if the discharger does not comply with BACT a predetermined structure of fee surcharges would be applied on top of the base level of administrative fees.

- Fee surcharges would increase annually on a geometric scale until the discharger demonstrated compliance with BACT. The surcharge scale would be set at a level sufficient to provide a strong economic incentive for the discharger to comply with BACT.

11. THE SUSTAINABLE ENVIRONMENT FUND

The Sustainable Environment Fund was established by the province to provide a dedicated source of funding for environmental initiatives and the renewal of provincial forests (British Columbia, 1990). This fund will be the instrument through which the fourth principle, reinvestment of revenue in waste management initiatives, would be addressed. Currently the fund receives revenue from:

- waste management permit fees;
- the environmental levies;
- revenue from environmental prosecutions;
- transfers from the provincial Lottery Fund; and contributions to the fund from the federal-provincial Forest Resources Development Agreement.

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[11] Best Available Control Technology (BACT) is defined as "currently available state-of-the-art control technology which is proven to be successful in reducing waste discharge and has been applied for at least one year in similar facilities in the province or in other relevant jurisdictions".

During 1990/91 and 1991/92, the fund has been used to provide funds for the following waste management initiatives:

- Solid Waste Management Strategy - the first year of a multi-year plan that has a goal of reducing the province's municipal solid waste stream by 50% by the year 2000;

- Hazardous Waste Management Strategy - the establishment of a provincial Crown corporation to develop and implement a strategy for the disposal of hazardous wastes in the Province;

- Vehicle Inspection Maintenance Program - the implementation of a vehicle emission inspection program in the Lower Mainland as part of an air pollution control strategy;

- Innovative Waste Management Program - providing financial assistance for new technologies and processes for collecting, treating and disposing of municipal liquid and solid wastes; and

- Other Initiatives - including energy conservation, soil and water protection programs, and funding to ensure trained prosecutors are available to address the growing number of cases of environmental infractions.

While all revenues generated by the current fee system are deposited into the Sustainable Environment Fund, the Ministry proposes that there be a more direct attribution between the fee revenue and programs associated with waste management and the permit process.

12. SUMMARY AND CONCLUSIONS

The Ministry's proposals to revise British Columbia's current waste discharge permit fee system, in accordance with the principles of equity, polluter pay, cost recovery and reinvestment of revenue, will enable the Province to move forward on each of the four objectives discussed at the start of this paper:

- **Economic Efficiency** - The fees will cause polluters to internalize at least some of the external costs associated with their waste discharges. The fees could initially be set to recover all or part of the discharge permit system's regulatory costs and expanded to include other environmental costs as these costs are identified. The fees would also promote the conservation of the environment's natural assimilative capacities.

- **Economic Incentive** - The fees, which vary by type and quantity of pollutant discharged, will provide an ongoing incentive for waste dischargers to reduce their discharges. By basing the fee rate for each pollutant type on the pollutant's potential environmental impact, the fee system will provide waste dischargers with a greater incentive to reduce the discharges of the more harmful pollutants.

- **Equity** - The current permit fee system is inequitable in its treatment of different industries and among firms within industry groups. As noted earlier the system is also highly inequitable in its treatment of municipal permit holders. Revising the fees to reflect the quantity and type of waste discharged by a permittee will remove these inequities.

- **Cost Recovery** - The fees can be set to at least recover the costs of the province's waste management function in accordance with the polluter pays principle.

In addition, this proposal to revise the waste discharge permit fee system, through the use of economic incentives, represents a major step to satisfying the Ministry's vigorous and ambitious commitment to zero pollution and full environmental protection.

The purpose of this paper was to present for public review and comment, the Ministry of Environment, Lands and Parks' proposals for revising the Province's waste discharge permit fee system. As stressed earlier, the proposals contained in this paper are just that, proposals, and do not necessarily represent the final version of the revised waste discharge permit fee system. Since these revisions could affect many businesses and communities it is only fair that all interested parties have an opportunity to comment on these proposals before any final decisions are

made. Thus, the Ministry invites public comments on its proposals. All written submissions must be received by the Ministry by March 15, 1992.

Submissions on the proposed waste discharge permit fee system should be forwarded to:

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Evaluation, Economics and Laboratory Services Branch
Environmental Protection Division
Ministry of Environment, Lands and Parks
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APPENDIX A

DETERMINING THE RELATIVE IMPACT OF POLLUTANTS

DETERMINING THE RELATIVE IMPACT OF POLLUTANTS

Within each discharge medium (air, water and land), the fees for each type of pollutant discharged should be based on the relative damage each pollutant may potentially cause to the environment. For example, if air emissions of total reduced sulphur (TRS) potentially cause thirty times more damage than air emissions of particulate matter, then a fee for a tonne of TRS should be thirty times greater than the fee for a tonne of particulate. The provincial air and water quality ambient objectives and pollution control objectives could be used to determine the relative weights assigned to each pollutant type discharged to air or water. For solid wastes, the fees could be based on the type of material being landfilled, ie. special wastes, mixed municipal wastes, or inert industrial wastes.

Table A-1 presents the one-hour and 24-hour B level air quality objectives for 22 pollutants, as taken from the provincial pollution control objectives for various industries. The B level objectives established the maximum concentrations of pollutants established to provide adequate protection against adverse effects on human health and comfort. In this example, particulate has been arbitrarily chosen as the base pollutant against which the relative environmental impacts of the other air pollutants can be measured[1]. Table A-1 shows that 200 micrograms per cubic meter of particulate has the same rating as 300 micrograms per cubic meter of nitrogen dioxide. Thus, nitrogen dioxide is assigned a weight of 2/3 relative to particulate. The weights for the other pollutants can be calculated in a similar manner, as shown in the right hand column of Table A-1.

Table A-2 presents typical water quality B level effluent objectives from the various provincial pollution control objectives. The relative environmental impact weights have been calculated using suspended solids, again chosen arbitrarily, as the base pollutant.

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[1] The choice of which pollutant to use as the base unit will not affect the analysis.

TABLE A-1

AIR QUALITY B LEVEL OBJECTIVES

(micrograms per cubic meter)

Pollutant	1 - Hour	24 - Hour	Weight
Particulate		200	1.000
Nitrogen Dioxide	1000	300	0.667
Ozone	160	50	4.000
Sulphur Dioxide	900	260	0.769
Total Reduced Sulphur	28	6	33.333
Chlorine and Chlorine Dioxide		300	0.667
Carbon Monoxide	28000		0.025
Antimony		0.5	400.0
Arsenic		1.0	200.0
Beryllium		0.1	2,000
Cadmium		0.3	666.7
Chromium		0.1	2,000
Copper		2.5	80.0
Fluorine		2.0	100.0
Lead		2.5	80.0
Mercury		1.0	200.0
Molybdenum		2.5	80.0
Nickel		O.1	2,000
Selenium		0.5	400.0
Uranium		6.0	33.33
Vanadium		1.0	200.0
Zinc		2.5	80.0

Source: British Columbia, 1974, 1975a, 1975b, 1977, 1979.

TABLE A-2

TYPICAL WATER QUALITY EFFLUENT OBJECTIVES

Pollutant Type	Concentration (mg/litre)	Weight
Suspended Solids	75.01	.0
BOD	50.0	1.5
Oil and Grease	15.0	5.0
Ammonia	10.0	7.5
Nitrates	25.0	3.0
Chlorine (Cl)	0.5	150.0
Phenol	0.3	250.0
Phosphate (as P)	10.0	7.5
Sulphate	250.0	0.3
Sulphide	1.0	75.0
Aluminum	1.0	75.0
Antimony	1.0	75.0
Arsenic	1.0	75.0
Barium1	.0	75.0
Boron	5.0	15.0
Cadmium	1.0	75.0
Chromium	0.3	250.0
Cobalt	1.0	75.0
Copper0	.3	250.0
Cyanide (as CN)	0.5	150.0
Fluoride	10.0	7.5
Iron	1.0	75.0
Lead	0.2	375.0
Manganese	1.0	75.0
Mercury	0.005	15,000.0
Molybdenum	5.0	15.0
Nickel	1.0	75.0
Selenium	0.5	150.0
Silver	0.5	150.0
Tin	5.0	15.0
Zinc	1.0	75.0
Toxicity	50.0%	n.a.

Source: British Columbia 1974, 1975a, 1975b, 1977, 1979.

It should be noted that, in the calculation of the pollutant fees, upper limits were imposed on the pollutant weights: 40 was imposed for air pollutants and 20 for water pollutants. This was done to simplify the calculation and administration of the fees.

Development of a weighting scheme for effluent toxicity had to follow a slightly different route because it cannot be converted to tonnes discharged. However if we assume, as is being done for the other pollutants, that at the margin one cubic metre of effluent with an LC_{50} of 50% has the equivalent environmental impact of one cubic metre of effluent with a concentration of suspended solids of 75 mg/l, then an equivalency can be determined (see Table A-2).[2] Under this assumption the discharge of 20 cubic metres per day with an LC_{50} of 50% will be approximately equivalent to a discharge of one tonne of suspended solids at a concentration of 75 mg/l of effluent. Thus, for the purpose of calculating the discharge permit fees a unit of toxicity will be defined as the discharge of 20 cubic metres per day with an LC_{50} of 50%. To calculate the number of units of toxicity for LC_{50} values of other than 50% the following formula would be used:

Toxicity Units = (Avg. Daily Flow / 20) x (100 - LC_{50}) / 100.

[2] The toxicity of effluent is measured using LC_{50} values which are the percentage of effluent by volume in which 50% of the test fish survive for a specified time.